

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
26 May 2005 (26.05.2005)

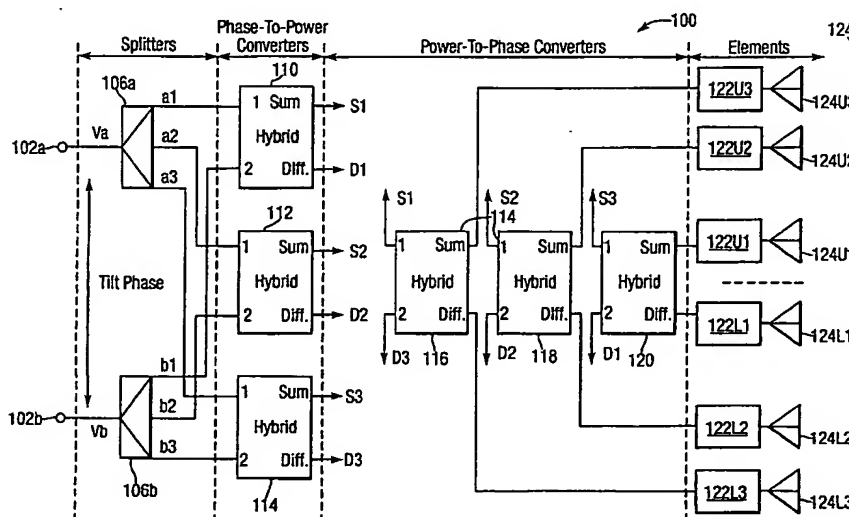
PCT

(10) International Publication Number
WO 2005/048401 A1

- (51) International Patent Classification⁷: **H01Q 1/24**, H04Q 7/36, H01Q 3/36, 3/40, 21/06
- (21) International Application Number:
PCT/GB2004/004586
- (22) International Filing Date: 29 October 2004 (29.10.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
0325987.6 7 November 2003 (07.11.2003) GB
- (71) Applicant (for all designated States except US): **QUINTEL TECHNOLOGY LIMITED** [GB/GB]; Registered Office, 18 Upper Grosvenor Street, London W1K 7PW (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **THOMAS, Louis, David** [GB/GB]; Malvern Technology Centre, St. Andrew's Road, Malvern, Worcs WR14 3PS (GB). **HASKELL, Philip, Edward** [GB/GB]; QinetiQ Limited, Haslar Marine Technology Park, Gosport Hants PO12 2AG (GB).
- (74) Agent: **WILLIAMS, A., W., S.**; QinetiQ Ltd, IP Formalities, Cody Technology Park, A4 Building, Room G016, Ively Road, Farnborough, Hampshire GU14 0LX (GB).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: PHASED ARRAY ANTENNA SYSTEM WITH CONTROLLABLE ELECTRICAL TILT



(57) Abstract: A phased array antenna system with controllable electrical tilt generates two signals V2a and V2b with variable relative delay therebetween. The signals are converted into antenna element drive signals by a power distribution network (100). The network (100) splits each of the two signals V2a and V2b into three signal components. Pairs of components of different signals are input to respective (180) hybrid coupling devices (hybrids) (110, 112 and 114), which provide vector sums and differences of their inputs and act as phase-to-power converters. Their outputs are distributed between further (180) hybrids (116, 118 and 120), which act as power-to-phase converters and provide antenna element drive signals with phase varying both with element array position and also with the variable relative delay between the two signals V2a and V2b. Antenna electrical tilt is therefore controllable by altering a single relative delay.



Declaration under Rule 4.17:

— of inventorship (Rule 4.17(iv)) for US only

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.